AMENDMENTS

Please amend the application as indicated hereafter.

In the Claims

Please amend the claims as indicated below. The language being added is underlined ("___") and the language being deleted contains strikethrough ("—"):

1. (Currently Amended) A method for encoding fractional bit rates in a communication system, comprising:

receiving information from a destination transceiver, the information comprising information for determining a desired fractional bit rate of the destination transceiver and further including logic for encoding an integer number of bits into a plurality of symbols at the desired fractional bit rate using ~~and relating to~~ a plurality of signal space constellation points supported by the destination transceiver;

based on the information from the destination transceiver, encoding an integer number of bits into the plurality of symbols at the desired fractional bit rate using the logic for encoding the integer number of bits into the plurality of symbols received from the destination transceiver, the ratio of the integer number of bits and the plurality of symbols being a non-integer; and

based on the information from the destination transceiver, encoding each of the plurality of symbols into one of a plurality of analog symbols corresponding to the signal space constellation points.

2. (Canceled)

3. (Previously Presented) The method of claim 1, wherein the encoding an integer number of bits into a plurality of symbols involves modulus conversion.

4. (Previously Presented) The method of claim 1, wherein the encoding an integer number of bits into a plurality of symbols involves shell mapping.

5. (Previously Presented) The method of claim 1, wherein the encoding an integer number of bits into a plurality of symbols involves constellation switching.

6. (Canceled)

7. (Previously Presented) The method of claim 1, wherein the information received from the destination transceiver further comprises logic for mapping each of the plurality of symbols into one of a plurality of analog symbols and the encoding of each of the plurality of symbols into one of a plurality of analog symbols uses the logic for mapping each of the plurality of symbols into one of a plurality of analog symbols.

8. (Previously Presented) The method of claim 1, wherein the information from the destination transceiver further comprises an encoding algorithm and the encoding an integer number of bits into a plurality of symbols is performed using the encoding algorithm.

9. (Previously Presented) The method of claim 1, wherein the encoding each of the plurality of symbols into one of a plurality of analog symbols corresponding to the signal space constellation points is further based on the output of a forward error correction code device.

10. (Previously Presented) The method of claim 1, further comprising applying each of the plurality of analog symbols to a gain scalar.

11. (Previously Presented) The method of claim 1, further comprising providing the plurality of analog symbols corresponding to the signal space constellation points to the destination transceiver.

12. (Previously Presented) The method of claim 11, wherein the providing the plurality of analog symbols corresponding to the signal space constellation points to the destination transceiver is via a digital subscriber line (DSL).

13. (Canceled)

14. (Currently Amended) A transceiver, comprising:

means for receiving information from a destination transceiver, the information comprising information for determining a desired fractional bit rate of the destination transceiver and further including logic for encoding an integer number of bits into a plurality of symbols at the desired fractional bit rate using ~~and relating to~~ a plurality of signal space constellation points supported by the destination transceiver;

means for encoding, based on the information from the destination transceiver, an integer number of bits into the plurality of symbols at the desired fractional bit rate using the logic for encoding the integer number of bits into the plurality of symbols received from the destination transceiver, the ratio of the integer number of bits and the plurality of symbols being a non-integer; and

means for encoding, based on the information from the destination transceiver, each of the plurality of symbols into one of a plurality of analog symbols corresponding to the signal space constellation points.

15. (Canceled)

16. (Previously Presented) The transceiver of claim 14, wherein the means for encoding an integer number of bits into a plurality of symbols involves a modulus conversion means.

17. (Previously Presented) The transceiver of claim 14, wherein the means for encoding an integer number of bits into a plurality of symbols involves a shell mapping means.

18. (Previously Presented) The transceiver of claim 14, wherein the means for encoding an integer number of bits into a plurality of symbols involves a constellation switching means.

19. (Canceled)

20. (Previously Presented) The transceiver of claim 14, wherein the information received from the destination transceiver further comprises logic for mapping each of the plurality of symbols into one of a plurality of analog symbols and the encoding of each of the plurality of symbols into one of a plurality of analog symbols uses the logic for mapping each of the plurality of symbols into one of a plurality of analog symbols.

21. (Previously Presented) The transceiver of claim 14, wherein the information from the destination transceiver further comprises an encoding algorithm and the encoding an integer number of bits into a plurality of symbols is performed using the encoding algorithm.

22. (Previously Presented) The transceiver of claim 14, wherein the encoding each of the plurality of symbols into one of a plurality of analog symbols corresponding to the signal space constellation points is further based on the output of a forward error correction encoding means.

23. (Previously Presented) The transceiver of claim 14, further comprising means for gain scaling each of the plurality of analog symbols.

24. (Previously Presented) The transceiver of claim 14, further comprising means for providing the plurality of analog symbols to the destination transceiver.

25. (Original) The transceiver of claim 24, wherein the plurality of analog symbols are provided to the destination transceiver via a digital subscriber line (DSL).

26. (Currently Amended) A transceiver for use in a communication system, comprising:

a receiver adapted to receive information from a destination transceiver, the information comprising information for determining a desired fractional bit rate of the destination transceiver and further including logic for encoding an integer number of bits into a plurality of symbols at the desired fractional bit rate using ~~and relating to~~ a plurality of signal space constellation points supported by the destination receiver;

a fractional encoder associated with the receiver, the fractional encoder adapted to encode the integer number of bits into a plurality of symbols at the desired fractional bit rate based on the logic for encoding the integer number of bits into the plurality of symbols received from the destination transceiver, the ratio of the integer number of bits and the plurality of symbols being a non-integer;

a constellation encoder associated with the fractional encoder, the constellation encoder adapted to encode, based on the information from the destination transceiver, each of the plurality of symbols into one of a plurality of analog symbols corresponding to the signal space constellation points; and

a transmitter associated with the constellation encoder, the transmitter adapted to provide the plurality of analog symbols to the destination transceiver.

27. (Original) The transceiver of claim 26, wherein the fractional encoder encodes the integer number of bits into the plurality of symbols via modulus conversion.

28. (Original) The transceiver of claim 26, wherein the fractional encoder encodes the integer number of bits into the plurality of symbols via shell mapping.

29. (Original) The transceiver of claim 26, wherein the fractional encoder encodes the integer number of bits into the plurality of symbols via constellation switching.

30. (Canceled)

31. (Previously Presented) The transceiver of claim 26, wherein the information received from the destination transceiver further comprises logic for mapping each of the plurality of symbols into one of a plurality of analog symbols and the constellation encoder is adapted to encode each of the plurality of symbols into one of the plurality of analog symbols based on the logic for mapping each of the plurality of symbols into one of a plurality of analog symbols.

32. (Previously Presented) The transceiver of claim 26, wherein the information from the destination transceiver comprises an encoding algorithm and the fractional encoder is further adapted to implement the encoding algorithm to encode the integer number of bits into the plurality of symbols.

33. (Previously Presented) The transceiver of claim 26, wherein the constellation encoder is further adapted to encode each of the plurality of symbols into one of the plurality of analog symbols corresponding to the signal space constellation points based on the output of a forward error correction code encoder.

34. (Original) The transceiver of claim 26, further comprising a gain scalar.

35. (Original) The transceiver of claim 26, wherein the plurality of analog symbols are provided to a digital subscriber line (DSL).

36. (Currently Amended) A method for controlling the symbol transmission rate in a communication system, comprising:

providing information to a source transceiver, the information comprising information capable of being used to determine a fractional bit rate to use for transmitting data to a destination transceiver and further comprising logic adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols at the desired fractional bit rate using a plurality of signal space constellation points supported by the destination transceiver;

receiving a plurality of analog symbols from the source transceiver, each of the plurality of analog symbols corresponding to a signal space constellation point of the plurality of signal space constellation points supported by the destination transceiver; and

decoding the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to the fractional bit rate.

37. (Original) The method of claim 36, wherein the decoding the plurality of analog symbols involves modulus conversion.

38. (Original) The method of claim 36, wherein the decoding the plurality of analog symbols involves shell mapping.

39. (Original) The method of claim 36, wherein the decoding the plurality of analog symbols involves constellation switching.

40. (Previously Presented) The method of claim 36, wherein the information comprises a number of signal space constellation points.

41. (Canceled)

42. (Previously Presented) The method of claim 36, wherein the information provided to the source transceiver further comprises mapping logic adapted to enable the source transceiver to encode each of the plurality of symbols into one of the plurality of analog symbols.

43. (Original) The method of claim 36, wherein the information further comprises an encoding algorithm adapted to enable the source transceiver to execute the encoding algorithm and encode at the fractional bit rate.

44. (Original) The method of claim 43, wherein the encoding algorithm involves modulus conversion.

45. (Original) The method of claim 43, wherein the encoding algorithm involves shell mapping.

46. (Original) The method of claim 43, wherein the encoding algorithm involves constellation switching.

47. (Canceled)

48. (Currently Amended) A transceiver for use in a communication system, comprising:

means for providing information to a source transceiver, the information comprising information capable of being used to determine a fractional bit rate to use for transmitting data to a destination transceiver and further comprising logic adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols at the desired fractional bit rate using a plurality of signal space constellation points supported by the destination transceiver;

means for receiving a plurality of analog symbols from the source transceiver, each of the plurality of analog symbols corresponding to a signal space constellation point of the plurality of signal space constellation points supported by the destination transceiver; and

means for decoding the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to the fractional bit rate.

49. (Original) The transceiver of claim 48, wherein the means for decoding the plurality of analog symbols involves a modulus conversion means.

50. (Original) The transceiver of claim 48, wherein the means for decoding the plurality of analog symbols involves a shell mapping means.

51. (Original) The transceiver of claim 48, wherein the means for decoding the plurality of analog symbols involves a constellation switching means.

52. (Previously Presented) The transceiver of claim 48, wherein the information comprises a number of signal space constellation points.

53. (Canceled)

54. (Previously Presented) The transceiver of claim 48, wherein the information provided to the source transceiver further comprises mapping logic adapted to enable the source transceiver to encode each of the plurality of symbols into one of the plurality of analog symbols.

55. (Original) The transceiver of claim 48, wherein the information further comprises an encoding algorithm adapted to enable the source transceiver to execute the encoding algorithm and encode at the fractional bit rate.

56. (Original) The transceiver of claim 55, wherein the encoding algorithm involves modulus conversion.

57. (Original) The transceiver of claim 55, wherein the encoding algorithm involves shell mapping.

58. (Original) The transceiver of claim 55, wherein the encoding algorithm involves constellation switching.

59. (Canceled)

60. (Currently Amended) A transceiver for use in a communication system, comprising:

a transmitter adapted to provide information to a source transceiver, the information comprising information capable of being used to determine a fractional bit rate to use for transmitting data to a destination transceiver and further comprising logic adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols at the desired fractional bit rate using a plurality of signal space constellation points supported by the destination transceiver;

a receiver adapted to receive a plurality of analog symbols from the source transceiver, each of the plurality of analog symbols corresponding to a signal space constellation point of the plurality of signal space constellation points supported by the destination transceiver; and

a fractional decoder adapted to decode the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to the fractional bit rate.

61. (Original) The transceiver of claim 60, wherein the fractional decoder is a modulus converter.

62. (Original) The transceiver of claim 60, wherein the fractional decoder is a shell mapper.

63. (Original) The transceiver of claim 60, wherein the fractional decoder employs constellation switching.

64. (Previously Presented) The transceiver of claim 60, wherein the information comprises a number of signal space constellation points.

65. (Canceled)

66. (Previously Presented) The transceiver of claim 60, wherein the information provided to the source transceiver further comprises mapping logic adapted to enable the source transceiver to encode each of the plurality of symbols into one of the plurality of analog symbols using the plurality of mapping values.

67. (Original) The transceiver of claim 60, wherein the information further comprises an encoding algorithm adapted to enable the source transceiver to execute the encoding algorithm and encode at the fractional bit rate.

68. (Original) The transceiver of claim 67, wherein the encoding algorithm involves modulus conversion.

69. (Original) The transceiver of claim 67, wherein the encoding algorithm involves shell mapping.

70. (Original) The transceiver of claim 67, wherein the encoding algorithm involves constellation switching.

71. (Previously Presented) The method of claim 1, wherein the communication system is a pulse amplitude modulation (PAM) system, and the signal space constellation points correspond to PAM levels.

72. (Previously Presented) The method of claim 1, wherein the number of signal space constellation points is not equal to a power of 2.

73. (Previously Presented) The transceiver of claim 14, wherein the signal space constellation points correspond to pulse amplitude modulation (PAM) levels.

74. (Previously Presented) The transceiver of claim 14, wherein the number of signal space constellation points is not equal to a power of 2.

75. (Previously Presented) The transceiver of claim 26, wherein:

the transceiver is for use in a pulse amplitude mode (PAM) communication system;

the signal space constellation points correspond to PAM levels; and

the constellation encoder is a PAM mapper.

76. (Previously Presented) The transceiver of claim 26, wherein the number of signal space constellation points is not equal to a power of 2.

77. (Previously Presented) The method of claim 36, wherein, the communication system is a pulse amplified modulation (PAM) system, and the signal space constellation is a PAM signal space constellation.

78. – 81. (Canceled)

82. (Previously Presented) The transceiver of claim 60, wherein the communication system is a pulse amplitude modulation (PAM) communication system and the signal space constellation is a PAM signal space constellation.

83. – 91. (Canceled)

92. (Previously Presented) The method of claim 7, wherein the logic for mapping each of the plurality of symbols into one of a plurality of analog symbols comprises a plurality of mapping values for arrangement in at least one look-up-table, and the encoding of each of the plurality of symbols into one of a plurality of analog symbols uses the plurality of mapping values received from the destination transceiver in the at least one look-up table.

93. (Previously Presented) The method of claim 1, wherein the logic for encoding an integer number of bits into a plurality of symbols comprises a plurality of encoding values for arrangement in at least one look-up-table, and the encoding of the integer number of bits into the plurality of symbols uses the plurality of encoding values received from the destination transceiver in the at least one look-up table.

94. (Previously Presented) The transceiver of claim 20, wherein the logic for mapping each of the plurality of symbols into one of a plurality of analog symbols comprises a plurality of mapping values for arrangement in at least one look-up-table, and the encoding of each of the plurality of symbols into one of a plurality of analog symbols uses the plurality of mapping values received from the destination transceiver in the at least one look-up table.

95. (Previously Presented) The transceiver of claim 14, wherein the logic for encoding an integer number of bits into a plurality of symbols comprises a plurality of encoding values for arrangement in at least one look-up-table, and the encoding of the integer number of bits into the plurality of symbols uses the plurality of encoding values received from the destination transceiver in the at least one look-up table.

96. (Previously Presented) The transceiver of claim 31, wherein the logic for mapping each of the plurality of symbols into one of a plurality of analog symbols comprises a plurality of mapping values for arrangement in at least one look-up-table, and the encoding of each of the plurality of symbols into one of a plurality of analog symbols uses the plurality of mapping values received from the destination transceiver in the at least one look-up table.

97. (Previously Presented) The transceiver of claim 26, wherein the logic for encoding an integer number of bits into a plurality of symbols comprises a plurality of encoding values for arrangement in at least one look-up-table, and the encoding of the integer number of bits into the plurality of symbols uses the plurality of encoding values received from the destination transceiver in the at least one look-up table.

98. (Previously Presented) The method of claim 42, wherein the mapping logic adapted to enable the source transceiver to map each of the plurality of symbols into one of the plurality of analog symbols comprises a plurality of mapping values for arrangement in at least one look-up-table.

99. (Previously Presented) The method of claim 36, wherein the logic adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols comprises a plurality of encoding values for arrangement in at least one look-up-table.

100. (Previously Presented) The transceiver of claim 54, wherein the mapping logic adapted to enable the source transceiver to map each of the plurality of symbols into one of the plurality of analog symbols comprises a plurality of mapping values for arrangement in at least one look-up-table.

101. (Previously Presented) The transceiver of claim 48, wherein the logic adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols comprises a plurality of encoding values for arrangement in at least one look-up-table.

102. (Previously Presented) The transceiver of claim 66, wherein the mapping logic adapted to enable the source transceiver to map each of the plurality of symbols into one of the plurality of analog symbols comprises a plurality of mapping values for arrangement in at least one look-up-table.

103. (Previously Presented) The transceiver of claim 60, wherein the logic adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols comprises a plurality of encoding values for arrangement in at least one look-up-table.

104. (Currently Amended) A method comprising:

receiving information from a destination transceiver, the information comprising an indicator of a desired fractional bit rate and <u>further comprising</u> logic for encoding an integer number of bits into a plurality of symbols at the desired fractional bit rate <u>using a plurality of signal space constellation points supported by the destination transceiver</u>; and

encoding the integer number of bits into the plurality of symbols using the logic received from the destination transceiver at the desired fractional bit rate, the ratio of the integer number of bits and the plurality of symbols being a non-integer.

105. (Previously Presented) The method of claim 104, further comprising:

receiving mapping logic from the destination transceiver, the mapping logic for encoding a plurality of symbols into one of a plurality of analog symbols that correspond to signal space constellation points supported by the destination transceiver; and

encoding the plurality of symbols into one of the plurality of analog symbols using the mapping logic received from the destination transceiver.

106. (New) The method of claim 104, wherein the encoding an integer number of bits into a plurality of symbols involves modulus conversion.

107. (New) The method of claim 104, wherein the encoding an integer number of bits into a plurality of symbols involves shell mapping.

108. (New) The method of claim 104, wherein the encoding an integer number of bits into a plurality of symbols involves constellation switching.

109. (New) The method of claim 104, wherein the information received from the destination transceiver further comprises logic for mapping each of the plurality of symbols into one of a plurality of analog symbols and the encoding of each of the plurality of symbols into one of a plurality of analog symbols uses the logic for mapping each of the plurality of symbols into one of a plurality of analog symbols.

110. (New) The method of claim 109, wherein the encoding each of the plurality of symbols into one of a plurality of analog symbols corresponding to the signal space constellation points is further based on the output of a forward error correction code device.

111. (New) The method of claim 109, further comprising applying each of the plurality of analog symbols to a gain scalar.

112. (New) The method of claim 109, further comprising providing the plurality of analog symbols corresponding to the signal space constellation points to the destination transceiver.

113. (New) The method of claim 109, wherein the providing the plurality of analog symbols corresponding to the signal space constellation points to the destination transceiver is via a digital subscriber line (DSL).

114. (New) The method of claim 104, wherein the communication system is a pulse amplitude modulation (PAM) system, and the signal space constellation points correspond to PAM levels.

115. (New) The method of claim 104, wherein the number of signal space constellation points is not equal to a power of 2.

116. (New) The method of claim 104, wherein the information from the destination transceiver further comprises an encoding algorithm and the encoding the integer number of bits into the plurality of symbols is performed using the encoding algorithm.